

As animals descend in the scale, the instinctive or reflex actions of the nervous system predominate over those that are "willed," or the voluntary actions.

In both Vertebrates and Invertebrates, as a rule, the parial limbs diverge from their arches nearer the neural than the hæmal sides of the trunk—nearer to the centres whence their nerves originate. In Vertebrates the joints or segments of the limbs bend toward the hæmal aspect; in Invertebrates they bend from the hæmal aspect: and thus the most frail and precious of the organic systems, namely the neural axis, is brought in Arthropods towards the least exposed and safest surface of the body, that, viz., which is downward, next the ground—therefore called the "belly," or ventral surface or aspect. When the myelencephalous tract runs along the most exposed, dorsal, side, it receives an immediate protection by a vertebral column. But the surfaces or aspects of the body which are truly homologous in the Snake and Caterpillar are the *neural* and the *hæmal*, not the *dorsal* and the *ventral*.

The Neuroptera of Madeira and the Canary Islands.

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[Read December 1, 1881.]

It has always appeared to me that attempts to work out, group by group, the fauna or flora of special countries or districts are duties to which the attention of naturalists should be especially directed. It is by means of such attempts that we are enabled, little by little, to grasp broad generalizations on the probable origin of the productions of certain districts, to ascertain the geographical distribution of species, and to form some idea of the possible means whereby, through a process of evolution, certain forms have acquired their existing characteristics as distinguishing them from others to which they are most closely allied.

cord" (p. 165), "Annelid nervous cord" (*ib.*); also, as synonyms of "myelonal canal"—"medullary canal" (p. 128), "neural canal" (p. 100), "central canal of the nervous system," equivalent to "myelencephalous canal;" "spinal canal" (p. 99), which, in surgery, is a synonym of "vertebral canal." The pages here quoted refer to the 'Elasmobranch Fishes' of Balfour.

If this be true regarding the value of local monographs for countries or districts separated arbitrarily by political frontiers, or physically by mountain-ranges, &c., such monographs become of far greater value when they concern small islands, or groups of islands, separated from the nearest mainland by wide distances and great depths of sea or ocean. Nothing could more forcibly demonstrate this than the labours of our late much lamented colleague T. Vernon Wollaston, who for a period of nearly thirty years devoted his energies, impaired though they too often were by periods of great bodily weakness, to an investigation of the Coleopterous fauna of the various Atlantic islands (beginning with Madeira). The results of his investigations (and of those of willing assistants), given to the public in a number of volumes, form by far the most valuable series of works of this nature that have ever been published, notwithstanding that the ideas held by our late colleague on the subject of variation of species may, in the opinion of many of us, have induced in him erroneous generalizations. He gave us the facts, however much his own deductions therefrom may be disputed.

In the present paper I shall endeavour to put together all that is known concerning the Neuropterous insects (using the term in its Linnæan sense) of the islands under consideration; and the remarks that follow will show in how much we are indebted for our knowledge to T. V. Wollaston.

In endeavouring to state briefly the sources whence our present information has been derived, it will be well to treat the Madeiras and Canaries separately*.

MADEIRA.

This favoured island has been so much the resort of invalids from all countries, that it would have been singular if amongst them there had been no entomologists. On the other hand, it has been but little explored by entomologists who did not seek to restore or ameliorate impaired health; but there has been one prominent exception to this, to which attention will presently be drawn.

In 1793 Fabricius described in the 'Entomologia Systematica,' vol. ii. p. 93, a *Myrmeleon catta* from Madeira, in the collection of Sir Joseph Banks. The type of this (with the other Banksian

* I must here acknowledge the assistance I have derived from the rich library of the Royal Geographical Society.

insects) is now in the British Museum, having been presented to that Institution some years ago by this Society.

From that time up to 1815 I find no reference to Neuroptera from the island; but in the latter year there was published anonymously at Haddington a curious little book called 'The Traveller's Guide to Madeira and the West Indies:' it bears no date on the titlepage; but the preface is dated "Jan. 1815." Speaking of Dragonflies, the author says "there are several kinds, and the largest sort 3 inches long" (*Anax formosus* in all probability).

In Bowdich's 'Excursions in Madeira and Porto Santo,' 1825, p. 169, we find a reference to an "*Æschna* approaching *grandis*, and greatly resembling the species figured by Roesel, t. 2, Insect. Aquat. tab. ii. fig. 1." Roesel's insect is *Æschna cyanea* of modern authors; and there can be little doubt that the species observed by Bowdich was likewise *Anax formosus*.

In 1842, Rambur, in his 'Histoire des Insectes Névroptères,' indicates *Agrion pumilio* from Madeira (p. 278), which reference we find reproduced in De Selys-Longchamps and Hagen's 'Revue des Odonates d'Europe,' 1850, p. 184; and at p. 396 of this latter work is a reference of the occurrence in Madeira of *Libellula striolata*, *Anax formosus*, and *Agrion maderæ* (Rambur, MS.) in addition.

Harcourt, in his 'Sketch of Madeira,' published in 1854, alludes, at p. 125, to "several kinds of *Libellula*."

In De Selys-Longchamps and Hagen's 'Monographie des Gomphines,' 1857, p. 138, is a reference to a species of *Gomphus*, which still remains doubtful.

In vol. xii. of the 'Linnæa Entomologica,' published in 1858, we find notices by Hagen of two species of Termitidæ, viz. *Calotermes præcox* (p. 51), received by Wollaston from Heineken, and *Termes lucifugus* (pp. 178-179), with interesting accounts of the habits as observed by Hartung.

When Wollaston first left England for Madeira in 1847, it was probably with the hope that he should not be compelled to revisit the island for health's sake. As is well known, this was not to be; and on the occasion of his second visit he resolved to collect materials for an 'Insecta Maderensia,' remaining throughout the year for that purpose. This work was published in 1854, so far as the Coleoptera were concerned; but the author abandoned the idea of a general Insect Fauna of the islands, and his materials

for other orders formed the subjects of scattered papers by various writers. The Neuroptera were undertaken by Hagen; and in 1865, in vol. ii. of the 'Entomologists' Monthly Magazine,' appeared his 'Neuroptera of Madeira' (pp. 8-11, 25-28, 59-62, and 75-81), in which all the information at that time possessed was embodied. Hagen there notices or describes 26 species, of which only very few had been previously recorded as inhabiting the island. This is the groundwork of our knowledge of the Neuroptera of Madeira. [The part relating to the Trichoptera was also published almost simultaneously in the 'Stettiner entomologische Zeitung,' vol. xxvi. pp. 217-222.]

Beyond the necessary references to species in monographic works on special groups, nothing has since appeared.

In November and December 1880 my friend the Rev. A. E. Eaton, M.A., visited both Madeira and the Canary Islands, the first time that either had been explored by an experienced Neuropterist. Mr. Eaton was happily not driven thence by considerations of health; yet from other causes his movements were not altogether untrammelled, and the time of year was most unfavourable. His stay in Madeira was only from the 17th to the 30th of November (1880); nevertheless in those few days he collected 20 species, several of which were previously unknown. All the materials he generously placed at my disposal; and they formed the inducing cause of the production of the present paper. Let us hope that he, or some other equally experienced Neuropterist, may be able to explore the islands in the favourable season!

CANARY ISLANDS.

If our information be yet meagre for Madeira, it is far more so for the Canary Islands. Madeira is the sanatorium for the world. The Canary Islands are now forbidden to acknowledged invalids *from any cause*, although formerly the restrictions would not appear to have been so severe; for Heer, Hartung, Wollaston, and probably others, all in indifferent health, explored the islands. So also did the brothers Crotch and others, who could not be considered invalids; but almost the whole of these explorers confined their attention mainly to Coleoptera. I have only been able to compile the following references, but have reason to believe that both material and information are contained in French museums and publications that I have not been able to consult.

Probably the earliest work that contains any reference to Neuroptera is the Baron Bory de St. Vincent's 'Essai sur les Isles Fortunées et l'antique Atlantide,' published at Paris in "An XI." of the Revolution (=1803). At p. 369 we find references to 6 species of Neuroptera, including 4 Dragonflies, 1 "Hémérobe," and 1 *Myrmeleon*, all of which are extremely vague; all were possibly from Teneriffe.

Between 1836 and 1844 inclusive appeared the ponderous 'Histoire Naturelle des Iles Canaries,' by MM. P. Barker-Webb et Sabin Berthelot, the Neuropterous portion of which was worked out by Brullé, and occupies pp. 82, 83 of vol. ii. pt. 2. In it 13 species are noticed, including 5 Dragonflies, 4 Ant-lions, 4 Lacc-wing flies, several species being described as new; and with only one or two exceptions this has remained our sole guide to a knowledge of this portion of the insect productions of the islands. No indications of special islands are given. Webb and Berthelot's work has not escaped severe criticism: not the least pungent is that given by Wollaston in his 'Coleoptera Atlantidum,' 1865, introductory remarks pp. xx-xxii, who goes so far as to doubt whether some of the insects indicated may not have been really from Madeira. In some respects it is fortunate that the greater part of the types exist in the museum attached to the Jardin des Plantes at Paris; and I am under great obligations to Professor Emile Blanchard for having allowed me to examine, at home, the types of Neuroptera, including most of the species indicated.

In Burmeister's 'Handbuch der Entomologie,' vol. ii. pt. 2, p. 857 (1839), *Libellula chryso stigma* is described from Teneriffe.

In the Neuropterous portion of the 'Reise der Novara,' 1855, Brauer incidentally notices *Anax Parthenope* as occurring in Teneriffe (it is presumed there is no confusion with *A. formosus*, already recorded by Brullé from the islands, or *A. mauricianus*). Another Æschnide, *Cyrtosoma ephippigerum*, is mentioned by Hagen in 'Verhandl. z.-b. Gesellsch. Wieu,' vol. xvii. p. 31, as having been taken at sea off the Canaries.

Mr. Eaton's brief visit to the islands in 1880 occurred between the 6th and the 29th December: from the 6th to 12th he was in Grand Canary, from the 14th to 28th in Teneriffe; and a single day (the 29th) was devoted to the island of Palma (resulting in the discovery of an apparently peculiar species of *Chrysopa*). During this short stay he collected 18 species, included in which are several new forms; and the two large eastern islands, Lanzarote and

Fuerteventura†, and the smaller and western, Gomera and Hierro, were not visited.

I now proceed to summarize, in a tabular form, the species known to occur in Madeira and the Canaries, enumerated in the details that follow.

Name.	Madeira.	Canaries.	Occurring also in Europe.
TRICHOPTERA.			
LIMNOPHILIDÆ.			
<i>Limnophilus affinis</i> , <i>Curt.</i>	*	*
<i>Mesophylax aspersus</i> , <i>Ramb.</i> , var. <i>canariensis</i> , <i>M'Lach.</i>	*	?
— <i>oblitus</i> , <i>Hag.</i>	*		
HYDROPSYCHIDÆ.			
<i>Hydropsyche maderensis</i> , <i>Hag.</i>	*		
<i>Polycentropus flavo-stictus</i> , <i>Hag.</i> ...	*		
<i>Tinodes grisea</i> , <i>Hag.</i>	*		
— <i>cinerea</i> , <i>Hag.</i>	*		
— <i>canariensis</i> , <i>M'Lach.</i>	*	
— <i>merula</i> , <i>M'Lach.</i>	*		
RHYACOPHILIDÆ.			
<i>Pseudagapetus</i> (?) <i>punctatus</i> , <i>Hag.</i>	*		
HYDROPTILIDÆ.			
<i>Agraylea</i> (?) <i>insularis</i> , <i>Hag.</i>	*		
<i>Hydroptila</i> (?) <i>sp.</i>	*	*	
<i>Stactobia atra</i> , <i>Hag.</i>	*	*	
<i>Oxyethira sp.</i>	*		
PLANIPENNIA.			
HEMEROBIIDÆ.			
<i>Micromus aphidivorus</i> , <i>Schrank.</i>	*	*
<i>Hemerobius elegans</i> , <i>Steph.</i>	*	*
— <i>sp.</i>	*	*	?
— <i>nervosus</i> , <i>Fab.</i>	*	*	*
CHRYSOPIDÆ.			
<i>Chrysopa vulgaris</i> , <i>Schneid.</i>	*	*	[*]
— <i>fortunata</i> , <i>M'Lach.</i>	*	
— <i>subcostalis</i> , <i>M'Lach.</i>	*	
— <i>atlantica</i> , <i>M'Lach.</i>	*	*	
— <i>flaviceps</i> , <i>Brullé</i>	*	

† Heer, in his Catalogue of Insects appended to Hartung's "Die Geologischen Verhältnisse der Inseln Lanzarote und Fuerteventura" (Neue Denksch. naturf. Gesellsch. Zürich, 1856), mentions no Neuroptera.

Name.	Madeira.	Canaries.	Occurring also Europe.
PLANIPENNIA (<i>continued</i>).			
MYRMELEONIDÆ.			
<i>Palpares hispanus</i> , <i>Hag.</i> ?	*	*	?
<i>Formicaleo catta</i> , <i>Fab.</i>	*	*	
<i>Myrmeleon alternans</i> , <i>Brullé</i>	*	*	
— <i>distinguendus</i> , <i>Ramb.</i>	*	*
CONIOPTERYGIDÆ.			
<i>Coniopteryx</i> sp.	*	?
— <i>pulchella</i> , <i>M'Lach.</i>	*	
PSEUDO-NEUROPTERA.			
TERMITIDÆ.			
<i>Calotermes præcox</i> , <i>Hag.</i>	*		
<i>Termes lucifugus</i> , <i>Rossi</i>	*	*
PSOCIDÆ.			
<i>Psocus adustus</i> , <i>Hag.</i>	*		
— <i>personatus</i> , <i>Hag.</i>	*	*	
<i>Stenopsocus cruciatus</i> , <i>L.</i>	*	*
<i>Cæcilius marmoratus</i> , <i>Hag.</i>	*		
— <i>Dalii</i> , <i>M'Lach.</i>	*	*	*
<i>Peripsocus alboguttatus</i> , <i>Dalm.</i>	*	*
EPHEMERIDÆ.			
<i>Cloëon dipterum</i> , <i>L.</i>	*	*	*
<i>Baëtis rhodani</i> , <i>Pict.</i>	*	*	*
ODONATA.			
<i>Palpopleura marginata</i> , <i>Fab.</i>	*	
<i>Sympetrum striolatum</i> , <i>Charp.</i>	*	*	*
— <i>Fonscolombii</i> , <i>Selys.</i>	*	*	*
<i>Orthetrum</i> (?) <i>chrysostigma</i> , <i>Burm.</i>	*	
<i>Platetrum depressum</i> , <i>L.??</i>	??	
<i>Trithemis arteriosa</i> , <i>Burm.</i>	*	
<i>Crocothemis erythræa</i> , <i>Brullé.</i>	*	*
<i>Gomphus</i> sp.....	*	?
<i>Anax formosus</i> , <i>V. der Lind.</i>	*	*	*
— <i>mauricianus</i> , <i>Ramb.</i> ?	*		
— <i>Parthenope</i> , <i>Selys</i>	*	*
<i>Cyrtosoma ephippigerum</i> , <i>Burm.</i>	*	*
<i>Ischnura pumilio</i> , <i>Charp.</i>	*	*
— <i>senegalensis</i> , <i>Ramb.</i>	*		

An analysis of the above Table shows that 53 species are known from the islands: 37 are found in Madeira and 31 in the Canaries, 16 being common to both. Of these 53 species, 19 are known inhabitants of the continent of Europe, and 6 others are doubtful in this respect, owing to imperfect identification; 4 Odonata (*viz.* *Palpopleura marginata*, *Trithemis arteriosa*, *Anax mauricianus*,

and *Ischnura senegalensis**) are African species not known to occur in Europe.

Thus we find about 25 species that, so far as our present knowledge serves, are peculiar to the islands. It is quite possible that before the destruction of the forests, when the islands were better watered, the number of species was greater; it is also certain that much yet remains to be discovered. For instance, it is difficult to believe that the smaller forms of Perlidæ (*Leuctra* and *Nemoura*) are totally absent; so also it is difficult to believe that no Termitidæ exist in the Canary Islands; and several other examples might be cited.

That some of the purely terrestrial forms may have been introduced from Europe is very possible; on the other hand, I see no reason to doubt that some of the European forms mentioned may be considered true natives of the islands also; and it is still further possible that some forms apparently peculiar to the islands may yet be discovered in Southern Europe or North-western Africa; for in some respects we know less of the Neuropterous fauna of these regions than we now do of the islands. It is worthy of remark, however, that (with one possible exception) the whole of the species of Trichoptera are peculiar to the islands although belonging to familiar European genera, and that they all inhabit running water in the larval stage. These remarks show that it would be hasty to attempt generalizations from the Neuropterous fauna alone. With the Coleoptera it is different; and those who wish may obtain generalizations on these, from two very opposite points of view, by consulting Mr. Wollaston's 'Coleoptera Atlantidum' (and his other works), and Mr. Wallace's 'Geographical Distribution of Animals.'

TRICHOPTERA.

LIMNOPHILIDÆ.

LIMNOPHILUS AFFINIS, *Curtis*. (*L. cinctus*, Hag. Ent. Month. Mag. ii. p. 75; Stett. ent. Zeit. 1865, p. 217.—*L. affinis*, M'Lach. Revision & Synopsis, p. 82.)

Madeira (*Wollaston*).

Renewed examination has not revealed any tangible differences between the Madeiran examples (*L. cinctus*) and ordinary *L. affinis*. There is a certain amount of not-describable colour-variation

* To these it is possible that *Libellula chrysostigma*, Burm., should be added. Compare the detailed remarks on that species at pp. 177-179, *post*.

in the Madeiran form; and perhaps the intermediate appendages of the ♂ are slightly longer and less curved.

MESOPHYLAX, n. g. (= *Stenophylax*, Kol., partim).

Very closely allied to *Stenophylax* typically; differs especially in the spur of the anterior tibiæ of ♂ being so much reduced as to be microscopic, whereas the corresponding spur in the ♀ is long; hence the spur-formula is *quasi* 1, 3, 4 ♂, and 1, 3, 4 ♀; but the first joint of the anterior tarsi in the ♂ is as long as in the ♀. As other differences, it may be said that the palpi are more slender than in *Stenophylax* typically, the pronotum more developed, the median lobe of the vulvar scale notched or bifid.

The type of this genus is *Stenophylax aspersus*, Rambur. When I wrote my 'Revision and Synopsis of European Trichoptera,' I had not noticed the peculiarity in the spur of the anterior tibiæ of the ♂, and therefore placed *aspersus* in the typical group (*vide* Revision and Synopsis, p. 114) of *Stenophylax*. Renewed examination proves that this spur is virtually obsolete; it can only be detected microscopically, and when the tibiæ are in a particular position; the basal joint of the tarsi, however, is not at all abbreviated.

The Madeiran *Stenophylax oblitus*, Hagen, will fall into the same genus.

MESOPHYLAX ASPERSUS, *Rambur*, var. CANARIENSIS (*M' Lach.*).

Canaries: hills beyond San Mateo, Grand Canary, at a stream, 4550-4650 feet, 11th December (*Eaton*, 2 ♂).

The most remarkable feature in these Canarian examples is their *very small* size; expanse, ♂, 22-25 mm. (instead of 31-33 mm. in the typical form*). Upon comparing them, they appear to be identical in form and colours, and also in anal structure so far as this can be defined; but the superior and intermediate appendages cannot be examined in these dry individuals. The locality and altitude at which the examples were found prove that the form is a true native. In the absence of any obvious structural differences it would be rash to consider it a species; but it may justly be placed as an insular race.

Having made this unexpected discovery, Mr. Eaton, as is his custom, at once searched the stream for larvæ or cases, and succeeded in finding the larval condition of one of the Limmophilidæ;

* I have seen, however, a ♂ of *M. aspersus* from Spain in which the expanse is only 26 mm.

and there can, I think, be little doubt that it pertains to the same insect. The cases are cylindrical slightly curved tubes formed of coarse sand-grains, 14-15 mm. long, the diameter at the mouth-end about twice that at the tail-end. The larva has a black head and thoracic segments, and dull greenish abdomen; legs testaceous: it is of the true Limnophiliform type. The temperature of the water where they were found was 51° Fahr.

The type form of *aspersus* is essentially a South-European species, and especially given to concealing itself in caves. A much larger and much paler form is found further north, and is not uncommon in some localities in Switzerland &c.

MESOPHYLAX OBLITUS, *Hagen*. (*Stenophylax oblitus*, *Hag. Ent. Month. Mag.* ii. p. 76; *Stett. ent. Zeit.* 1865, p. 217; *M'Lach. Revision & Synopsis*, p. 115, pl. xiii.)

Madeira (*Wollaston*).

In my 'Revision and Synopsis,' p. 116, I called attention to the minute condition of the spur on the anterior tibiæ of the ♂, but had not then noticed that *S. aspersus* was precisely in the same condition. I now see that there is close relationship between *oblitus* and *aspersus*. The contour of the anterior wings of the former is considerably different, and so are the anal parts at first sight; but closer examination shows that the latter can be quite homologized with the same parts in *aspersus*; the bifid middle lobe of the vulvar scale of the ♀ is another point of resemblance. There is, however, no specific connection whatever between the two species.

HYDROPSYCHIDÆ.

HYDROPSYCHE MADERENSIS, *Hagen* (*Ent. Month. Mag.* ii. p. 77, *Stett. ent. Zeit.* 1865, p. 219; *M'Lach. Revision & Synopsis*, p. 367, pl. xxxix.).

Madeira (*Hartung, Wollaston*). Generally distributed about streams in November, especially in the north of the island (*Eaton*).

Eaton brought a dozen examples of both sexes, varying much in size and in intensity and variety of markings. Apparently a truly endemic species, of which the nearest European ally is probably *H. angustipennis*, *Curt.*, notwithstanding the colour-differences.

POLYCENTROPUS FLAVO-STICTUS, *Hagen* (*Ent. Month. Mag.*

ii. p. 79, Stett. ent. Zeit. 1865, p. 220; M'Lach. Revision & Synopsis, p. 400, pl. xlii.).

Madeira (*Wollaston*). Near Funchal, 19th November (*Eaton*).

TINODES GRISEA, *Hagen* (Ent. Month. Mag. ii. p. 79, Stett. ent. Zeit. 1865, p. 221; M'Lach. Revision & Synopsis, p. 414, pl. xliv.).

Madeira (*Wollaston*, ♀); at a "levada" on the cliff below Sant' Anna, 26th November (*Eaton*, 2 ♂).

This species was described from a ♀ only. I believe I am right in coupling therewith two ♂ collected by Eaton. If so, the affinity with *T. cinerea* is much greater than anticipated. The clothing of the head and anterior wings is entirely golden; the size is larger (but not so much as in the ♀ type). The anal appendages arranged quite after the same plan. The principal difference consists in the parts termed "intermediate" appendages in my "Revision." In *cinerea* these parts, if viewed laterally, are subcylindrical, not dilated, and regularly curved downward: in what I consider the ♂ of *grisea* these parts, viewed in the same position, are very much dilated and somewhat flattened in the apical portion, with a conspicuous tooth (distinct from the spines) on the upper edge that seems to escape from between the two appendages; the processes of the inferior appendages are stronger, especially the process of the lower edge, if viewed from beneath. Expanse 14-16 mm. (20 mm. in the ♀ type).

Amongst the large number of *T. grisea* collected by Eaton, I detect only these two supposed *cinerea*, which occurred in company with them.

TINODES CINEREA, *Hagen* (Ent. Month. Mag. ii. p. 78, Stett. ent. Zeit. 1865, p. 220; M'Lach. Revision & Synopsis, p. 416, pl. xliv.).

Madeira (*Wollaston*); generally distributed and common about small streams in November (*Eaton*).

Eaton brought about thirty examples of both sexes. They vary greatly in size, irrespective of sex (expanse $10\frac{1}{2}$ -16 mm.).

TINODES CANARIENSIS, n. sp.

A close ally of *T. cinerea*; apparently differing therefrom only in slight modifications of the anal structure in the ♂. The superior appendages are not perceptibly dilated toward the base, almost filiform throughout; the intermediate appendages appear to have a process below the apex, slightly exceeding them in

length; the process of the lower edge of the inferior appendages is very slender, greatly curved, its apex obliquely pectinate (*i. e.* with four or five teeth successively decreasing in length from the upper).

Canaries: a stream on the hills beyond San Mateo, Grand Canary, 4550–4650 feet, 11th December (*Eaton*, 1 ♂).

Amongst European species *T. unicolor*, Pict., has the superior appendages equally without any perceptible dilatation towards the base; but there is no close affinity otherwise.

In the two groups of islands with which we are now concerned, there thus appear to be three closely allied species of *Tinodes*, a genus that bids fair to become protean in allied forms when the localities in which it delights shall have been fully explored, and more especially as regards the Mediterranean district.

TINODES MERULA, n. sp.

Almost totally deep black, including the clothing of the head, thorax, and wings. Antennæ narrowly annulated with yellowish; articulations of tarsi narrowly yellowish; ovipositor of ♀ elongate, testaceous. Anterior wings having the apex slightly elongate; apical fork No. 3 long and narrow, No. 4 very long and broad; membrane iridescent. Expanse 12–13 mm.

Madeira: streamlet between Cama dos Lobos and Cabo Girão, 1780 feet, 20th November, 1 ♀; "levada" above Funchal, 3100 feet, 23rd November, 1 ♀ (*Eaton*).

In its black coloration this greatly resembles a large species of *Lype*; but it is a true *Tinodes*. Descriptions of species of *Tinodes* from the ♀ only must always be unsatisfactory, and are to be deprecated as a rule. But the number of *black* species of the genus is so small, that in working out an insular fauna, such as this, it is advisable to relax what should otherwise be the rule. *T. merula* must prove distinct, whatever may be its nearest relative amongst the black European forms.

RHYACOPHILIDÆ.

PSEUDAGAPETUS? PUNCTATUS, *Hagen*. (*Agapetus punctatus*, *Hag. Ent. Month. Mag.* ii. p. 80; *Stett. ent. Zeit.* 1859, p. 163, 1865, p. 221.—*P. (?) punctatus*, M'Lach. *Revision & Synopsis*, p. 485, pl. li.)

Madeira (*Wollaston*).

A *Pseudagapetus* according to the undilated intermediate legs

of the ♀, but an *Agapetus* according to the neuration of the posterior wings. Further materials are necessary before constituting a special genus for its reception.

HYDROPTILIDÆ*.

AGRAYLEA (?) INSULARIS, *Hagen*. (*Hydrorchestria insularis*, Hag. Stett. ent. Zeit. 1865, p. 219.—*A. insularis*, Eaton, Trans. Ent. Soc. Lond. 1873, p. 148; M'Lach. Revision & Synopsis, p. 508.)

Madeira (*Wollaston*).

This supposed species rests solely on the authority of a single ♀ example submitted to Hagen, but which was lost in the process of working-out. I have seen no species of *Agraylea* from the islands. The colour, as described, agrees with that of *Stactobia atra*.

HYDROPTILA (?), n. sp.

Madeira: between Cama dos Lobos and Cabo Girão, 1780 feet, 20th November; cliff below Sant' Anna, 500 feet, 26th November, (*Eaton*, 2 ♂).

Canaries: near Teror, 1600 feet, 9th December, and near San Mateo, about 4600 feet, 11th December, Grand Canary; in the botanic garden, Orotava, and a valley N.E. of Santa Cruz, 1300 feet, 25th December, Teneriffe (*Eaton*, many examples).

This insect will probably form a new genus. Although closely allied to *Hydroptila* (restricted), and with apparently the same neuration of the wings, it differs in the absence of the elevated lobes on the posterior portion of the head. I believe the same generic form is known to me from the French Pyrenees.

The specific identity of the Madeiran and Canarian examples appears probable; but the materials for the former are barely sufficient.

STACTOBIA ATRA, *Hagen*. (*Hydroptila atra*, Hag. Stett. ent. Zeit. 1865, p. 218; Ent. Month. Mag. ii. p. 77.—*Orthotrichia*

* The minute insects comprising this family require the strongest possible daylight for satisfactory elucidation. The month (November) in which this portion of the paper was written was the least favourable in this respect. In order, therefore, no longer to delay the publication of the paper (most of which has been written for many months), minute description of the Hydroptilidæ is reserved for the forthcoming additional Supplement to my 'Revision and Synopsis of the Trichoptera of the European Fauna.'

atra, Eaton, Tr. Ent. Soc. Lond. 1873, p. 142; M'Lach. Revision & Synopsis, p. 520.)

Madeira (*Wollaston*, 1 example); between Cama dos Lobos and Cabo Girão, 1780 feet, 20th November, and cliff below Sant' Anna, 500 feet, 26th November (*Eaton*, many examples).

Canaries: stream near Teror, 1600 feet, 9th December, Grand Canary (*Eaton*, 1 ♀).

I find that this insect is a true *Stactobia*, but much larger than the European forms of the genus.

OXYETHIRA, n. sp.

Madeira: Ribiero Frio, near Faial, 300 feet, 25th November, and cliff below Sant' Anna, 500 feet, 26th November (*Eaton*, four examples).

Apparently distinct from the European *O. costalis*.

PLANIPENNIA.

HEMEROBIIDÆ.

MICROMUS APHIDIVORUS, *Schrank*. (Hag. Ent. Month. Mag. ii. p. 59.)

Madeira (*Wollaston*).

HEMEROBIUS ELEGANS, *Stephens*.

Canaries: near Las Palmas, Grand Canary, beaten from olive, 6th December (*Eaton*).

The single example is strongly marked, resembling the variety *H. Marshami*, Steph. Possibly introduced?

HEMEROBIUS, sp. ? (*H. humuli*, L., Hag. Ent. Month. Mag. i. p. 60.)

Madeira (*Wollaston*, 1 ♀); near Funchal, 19th November (*Eaton*, 1 ♀).

Canaries: in the botanic garden at Orotava, Teneriffe, 15th December (*Eaton*, 1 ♀).

In all the three examples examined there are four sectors in the anterior wings (five sectors in one anterior wing, four in the other, in that from Teneriffe); *H. humuli* normally has only three, and the *facies* is slightly different. It would not be prudent to give a new name without seeing the ♂.

HEMEROBIUS NERVOSUS, *Fab.* (*H. hirtus*, Brullé, Hist. Canar. ii. pt. 2, p. 83, nec L.—*H. nervosus*, Hag. Ent. Month. Mag. ii. p. 60.)

Madeira (*Wollaston*); near the Ribiero de São Jorge, 26th November (*Eaton*).

Canaries (*Webb et Berthelot, Wollaston*).

From Madeira I have seen only the ♀. Brullé's type of *H. hirtus* is fortunately a ♂; otherwise its identification would have remained impossible, owing to its condition. There is also a ♂ in the British Museum amongst Wollaston's Canarian captures.

More materials are desirable. *H. nervosus* belongs to a group of species that can practically only be separated by the appendages of the ♂; and in some respects those of the Canarian examples do not appear to completely agree with those of *nervosus* of Northern Europe (but the position in those I have seen is not favourable for examination), and appear intermediate between *nervosus* and *subnebulosus*. Caution is necessary; for in examples from the Pyrenees and the French Alps in my collection a new species intermediate between those just mentioned appears to be clearly represented, but not identical with the Canarian specimens. Furthermore there is a form apparently common in the Swiss Alps (but of which I do not seem to have the ♂), in which the ♀ has a short upturned ovipositor.

CHRYSOPIDÆ.

CHRYSOPA VULGARIS, *Schneider*, et var. *MICROCEPHALA*, *Brauer*. (*Hemerobius albus* and *H. perla*, Brullé, Hist. Canar. ii. pt. 2, p. 83, nec L.—*Ch. vulgaris*, Hag. Ent. Month. Mag. ii. p. 60.)

Madeira (*Wollaston*); near Sant' Anna, 26th November (*Eaton*).

Canaries (*Webb et Berthelot*): near Las Palmas, Grand Canary, beaten from olive, 6th December (*Eaton*); in the botanic garden, Orotava, 15th December; from pine trees near Aguamansa, 16th December; on a carob-tree at Santa Cruz, 27th December, Teneriffé (*Eaton*).

Brauer is, I believe, now quite decided in his belief that *microcephala* is only a slight variety of *vulgaris* in which some of the costal nervules at the base have a slight dark indication at their junction with the subcosta, and some of the other basal nervules are faintly blackish; the face less suffused with rosy than in the typical form, and there is a blackish streak on the sides of the cheeks and on the sides of the clypeus. Coexisting with these peculiarities I generally find the dividing nervule of the third cubital cellule interstitiate with the nervule above it.

If *microcephala* could be maintained as distinct, it is probable that the whole (or nearly so) of the Madeiran and Canarian examples should be referred thereto. In twelve examples before me (five from Madeira, seven from the Canaries) the whole of these present the slight darkening of the basal nervules indicated above. In all of them, excepting two from Madeira and one from Teneriffe, the dividing nervule of the third cubital cellule is interstiate with the nervule above it; in only two of them—from Madeira and Teneriffe respectively—are the blackish lines on the sides of the face absent, in each case correlated with the normal third cubital cellule of *vulgaris*; in one—from Madeira—the lines on the face are present, and the third cubital cellule is normal. These conditions occurred together at the same place and under the same circumstances, indiscriminately. I think this is sufficient to prove that *microcephala* has no specific existence: the form thus termed appears to be decidedly more frequent in the south.

In Northern and Central Europe the examples found in winter or early spring are usually more or less suffused or spotted with reddish: this condition does not appear to exist in the islands, and is acquired during hibernation.

Brullé's types of *H. albus* and *H. perla* both belong here; of the latter, wings only exist.

Four examples taken by Eaton at Mazagan in Marocco, on the 7th January, are typical *vulgaris*.

This insect probably occurs in all the Atlantic islands. I have it from St. Helena. But the eggs, larvæ, or pupæ are exceedingly likely to be introduced with plants; hence it is possible it may not be strictly endemic.

CHRYSOPA FORTUNATA, n. sp.

Green, with a slight bluish tinge.

Antennæ moderately slender, dusky testaceous, darker toward the tips; basal joint very bulbose, yellowish, with an irregular blackish-brown longitudinal line above, and (sometimes) a blackish-brown dot at its apex internally. *Face* with a biarcuate blackish-brown transverse line below the antennæ, dilated on either side; clypeus broadly margined with blackish brown in its middle; a blackish-brown line on each cheek below the eyes, and a smaller one on each side of the clypeus. *Crown of head* with a narrow deeply biarcuate line above the antennæ, outlining the deep cavities in which the basal joints are inserted, forming an angle

between the basal joints (which is sometimes continued on the face as a short longitudinal line); in the middle are two parallel slightly interrupted longitudinal lines on the triangular elevated portion; and the superior orbits have a spot or band (all these markings more or less blackish brown). *Palpi* nearly black; the articulations and the apex of the terminal joint pale. *Pronotum* longer than broad, the sides nearly parallel; broadly margined on each side with blackish, forming broad lateral bands not quite complete, but more or less broken up by spots of the pale ground-colour. These marginal bands are more or less continued on each side of the *meso-* and *metanotum*, but are there much broken up into spots. *Pectus* and *pleuræ* green, more or less lined and spotted with black; pronotum wholly green.

Abdomen green, spotted with black on the sides (but arrangement not definable in dry examples).

Legs pale green, with minute black hairs; tarsi dusky; *claws* simple (not suddenly dilated internally), testaceous.

Wings moderately broad, the anterior scarcely acute at the extreme apex, the posterior more decidedly acute. In the anterior there is a conspicuous black spot near the base of the costa, another at the extreme base of the radius, another (sometimes indistinct) in the small anal area, and another (*triangular and very distinct*) near the base of the inner margin at the termination of the first postcostal nervule, which is somewhat incrassate; *all the longitudinal nervures pale*, the reticulation otherwise *wholly black*; the partition nervule of the third cubital cellule ending only slightly beyond the nervule above it; 5 nervules in the inner gradate series, 7 in the outer; short black hairs on all the reticulation; pterostigma slightly dusky. Posterior wings with a small blackish spot near the base of the costa; reticulation coloured as in the anterior.

Expanse 30-31 mm. Breadth of anterior wing 5-5½ mm.

Canaries: Santa Cruz de Las Palmas (island), 1800 feet, 29th December (*Eaton*, 2 ♀).

Amongst European species this is decidedly nearest to *Ch. Genei**

* In Schneider's monograph *Ch. Genei* is placed in a section (p. 63) characterized by the words "Secundo antennarum articulo brunneo aut nigro colore cincto." In order to prevent misapprehension, it is necessary to state that this character is not constant in *Genei*. On the other hand, there are indications that the second joint of the antennæ may sometimes be blackish or brownish in *fortunata*. The character fails as sectional (even if applied to its most typical

Rambur, of South Italy and Sardinia, and agrees with it in the simple claws, and also in the general system of coloration, and in form. It is larger, and distinct, especially in consequence of the spots at the base of the anterior wings. It also has affinity with *Chrysopa dorsalis*, Burmeister.

Var.? Smaller. Brighter green. All the markings on the head and thorax only faintly indicated; the pronotum without dark margins, but only with sublateral obscure lines; the meso- and metanotum with obscure lateral spots. Wings with the basal spots and colour of reticulation as in the type form; reticulation open; only 3 nervules in the inner and 5 in the outer gradate series in the anterior wings; the partition nervule of the third cubital cellule interstitiate with the nervule above it.

Expanse $23\frac{1}{2}$ mm.

One ♀ taken in company with the type form. I believe this is only a dwarf pale condition of *fortunata*; but the point can hardly be decided without further materials and local observation.

CHRYSOPA SUBCOSTALIS, n. sp.

Closely allied to *C. fortunata*. Differs as follows:—The two lines on the crown of the head reduced to dots, or absent altogether. The blackish margins of the pronotum very broad, and complete (not enclosing spots of the pale ground-colour); on the meso- and metanotum they are more or less broken up into spots. In the anterior wings the subcosta is *conspicuously black* for about half its length from the base, the longitudinal nervures otherwise green; the rest of the reticulation dusky, not so decidedly blackish as in *fortunata*, and (with the exception of the costal nervules) appearing almost green in certain lights; basal spots as in *fortunata*; but that in the anal area is not indicated, and that on the first postcostal nervule is still more distinct, and the nervule itself much thickened, the spot forming a raised shining black blister; partition nervule of the third cubital cellule rather more extended; 3 nervules in the inner gradate series, and 5–6 in the

species). All that can be said in its favour is that it is *the usual* condition in a series of species that otherwise agree in general form. But in this same series we find what ought to be a far more important character in the form of the tarsal claws, represented in both conditions, and to an extent that, without consideration of it, much confusion is likely to exist (ex. gr. *Ch. abbreviata* and *phyllochroma*).

outer. In the posterior wings the subcosta occasionally presents the same colour-peculiarity as in the anterior, but not constantly so; the costal nervules conspicuously black.

[According to notes on the living insect, the eyes are metallic green. Abdomen having the spiracular line, and a series of oblique linear marks above it, black; venter green and spotless.]

Expanse 25–29 mm. Breadth of anterior wing $4\frac{1}{2}$ –5 mm.

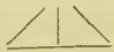
Canaries: in the botanic garden at Orotava, 15th December, on a carob-tree at Santa Cruz, 27th and 28th December, Teneriffe (*Eaton*, 5 ♀).

It may justly be suspected that *Ch. fortunata* and *subcostalis* are only insular forms one of the other, but maintaining their distinctive characters. *Ch. subcostalis* is considerably more like *dorsalis*, a resemblance heightened by the dark subcostal nervure. The black spot at the termination of the first postcostal nervule is a conspicuous character both in *fortunata* and *subcostalis*.

CHRYSOPA ATLANTICA, n. sp.

Full dark leaf-green (becoming dusky yellowish in old dry examples).

Antennæ slender, yellowish; basal joint bulbous, green like the body, with indications of a dark longitudinal line above; the second joint also indistinctly marked by a dark spot above. *Face* spotted with black as follows:—a lunate spot under each antenna, a large oval spot on each cheek, and a line on each side of the clypeus. *Labrum* reddish. *Crown of head* with a narrow biarcuate line limiting the elevated triangular portion, extended in an expanded manner between the antennæ, and forming a triangular mark in front at the summit of the face; the insertions of the antennæ indicated by a blackish transverse line. *Palpi* green, slightly marked with blackish externally; the terminal joint tipped with reddish-piceous.

Pronotum scarcely longer than broad, the sides parallel; on the disk is a blackish mark formed of lines, and indicating a triangle in which is a longitudinal line, thus ; lateral edges with a narrow blackish line somewhat furcate in front below the eyes. *Mesonotum* with a broad transverse black band in front at the junction with the pronotum, somewhat dilated on each side; all the sutures marking the divisions of the lobes narrowly black, with a short transverse black line between the lateral lobes; on each lateral lobe are two small black spots; a dusky longitu-

dinal line on the scutellum, continuous with the black median line of the anterior lobe. *Metanotum* likewise with black lines in the sutures, and spots on the lateral lobes. *Pectus* and *pleuræ* unspotted.

Abdomen marked with black (indistinctly in the dry insect). *Legs* green, with microscopic black hairs; tarsi dusky; *claws* much dilated internally at the base, the apical portion slender and strongly curved.

Wings broad, acute and almost angulate at the extreme tips. In the anterior pair there is a small blackish line close to the base of the costa, in front of a black tubercle at the extreme base; another blackish tubercle at the extreme base of the radius; reticulation dark green, with short black hairs; most of the transverse nervules &c. marked with blackish at each end (as also in the posterior); gradate nervules wholly black, 8 in the inner, 9 in the outer series; partition nervule of the third cubital cellule ending far beyond the nervule above it: pterostigma dusky.

[In the living insect the eyes are noted as coppery-green. The abdomen is intricately marked with black, each segment having a transverse fascia angulated on each side, and a lateral line emitting from the middle a finer line directed forwards and inwards, &c.]

Expanse 32–33 mm. Breadth of anterior wing $5\frac{3}{4}$ –6 mm.

Madeira (*Wollaston*; one ♀ in my collection).

Canaries: about pine trees near Agumansa, Teneriffe, 4000 feet, 16th December (*Eaton*, one ♀).

The example given to me by *Wollaston* is much discoloured.

It is difficult to assign to this a position with regard to European species; perhaps in some respects it might be placed near *Ch. formosa*.

CHRYSOPA FLAVICEPS, *Brullé*. (*Hemerobius flaviceps*, *Brullé*, Hist. Canar. ii. pt. 2, p. 83*.)

* The following is a copy of *Brullé's* description:—"De la grandeur de l'*H. chrysops*, dont il se distingue, ainsi que des espèces voisines, par la couleur fauve de sa tête et du premier article de ses antennes. On distingue sur la tête deux rangées transversales de points noirs. Le prothorax est d'un vert pâle avec quelques taches noires sur les côtés, et une ligne transversale et interrompue de la même couleur. Le reste du thorax est jaune avec des taches brunes sur les côtés. L'abdomen et les pattes sont jaunes. Les antennes sont obscures, à

Brullé's type is before me, discoloured by age. From it I have drawn up the following description:—Body wholly yellowish; the head scarcely paler, but more shining. *Antennæ* wholly fuliginous (almost blackish) with the exception of the basal and second joints, which are yellow; basal joint strongly bulbous; the second almost entirely occupied by a black ring.

Face with black markings as follows:—a large oval spot between the antennæ; a broad lunate spot below the antennæ; a short thick black line on each cheek. *Crown of head* marked with black as follows:—two median spots at the apex of the inflated portion, continued externally as lines margining the antennal cavities, and almost confluent, on the sides, with the lunate spots below the antennæ; a transverse series of 6 rather large (and unconnected) spots on the posterior margin, whereof the outer, on each side, is on the orbits. *Palpi* fuscous, with pale articulations; the terminal joint almost wholly black.

Pronotum (much damaged) longer than broad, apparently considerably narrowed in front, with black markings (compare Brullé's description).

Mesonotum marked with black as follows:—two large submedian spots on the front of the anterior lobe; lateral lobes with a large blotch posteriorly, and three spots anteriorly, the posterior sutures black; scutellum without markings. *Metanotum* with a black line in the suture between it and the pronotum; lateral lobes with two small black spots, and a large irregular curved black line, which is much dilated posteriorly. *Pleuræ* with black lines on the sutures, and a black spot at the insertion of the coxæ. *Pectus* spotted with black.

Abdomen apparently without markings, excepting a black lateral line on each side; rather densely clothed with black hairs.

Legs yellow, with microscopic black hairs; tarsi dusky; *claws* much dilated internally at the base.

Wings moderately broad, scarcely acute at the extreme tips, highly iridescent. In the anterior pair there is a black line near the base of the radius; longitudinal nervures wholly pale; costal

l'exception de leur premier article. Les ailes sont brillantes et irisées, avec les nervures en partie jaunes et en partie brunes. Les quatre ailes ont le parastigmate ou point épais très-distinct et colorié jaune-roux."

"Cette espèce doit se trouver en France, comme le témoigne un individu de la collection du Muséum, quoique sa description ne se trouve dans aucun auteur. Elle semble se rapprocher de l'*H. capitatus*, Fab."

nervules, those near the base of the wing, those between the radius and sector, and the gradate series wholly black, the others mostly only black at each end; all the neuration and the costal edge with long black hairs; 4 nervules in the inner gradate series, 7 in the outer; partition nervule of the third cubital cellule extending considerably beyond the nervule above it; pterostigma (in both pairs) long and conspicuously reddish-ochreous, more strongly defined than is usual, and extending into the subcostal area. In the posterior pair the costal, radial, and gradate nervules are black, but the others are almost wholly pale.

Expanse 32 mm. Breadth of anterior wing $5\frac{1}{2}$ mm.

I think Brullé must have been mistaken in supposing that an individual of this species had been found in France. I know of no European species in any way allied to it (perhaps the nearest is *Chrysopa formosa*, Brauer); the blackish antennæ, disposition of the black markings on head and thorax, and the strongly defined pterostigma are opposed to all European forms. Neither do I, at present, know of any closely allied extra-European species. Brullé's description is good, only not sufficiently precise. *Hemero-bius capitatus*, Fab., is very different, and pertains to the genus *Nothochrysa*, M'Lach.

MYRMELEONIDÆ.

? *PALPARES HISPANUS*, Hagen. (*Myrmeleon libelluloides*, L. ? , Bory de St. Vincent, Essai, p. 369.)

Madeira (a larva in my collection).

Canaries (*Bory de St. Vincent*).

I have seen no imago of *Palpares* from the islands. A larva from Madeira in my collection (obtained from a dealer) agrees with others from Tangier in Marocco, found there with the perfect insects of *P. hispanus*, which is possibly only a marked local variety of *libelluloides*. On the other hand, it is quite possible the Canarian species may be different, and perhaps identical with one of those from West Africa. Neither Webb and Berthelot, Wollaston, nor any modern traveller has noticed the existence of this conspicuous genus in the islands.

FORMICALEO CATTÀ, Fab. (*Myrm. catta*, F. Syst. Ent. p. 312; Brullé, Hist. Canar. ii. pt. 2, p. 83, pl. iii. fig. 3; Hag. Ent. Month. Mag. ii. p. 61.—*M. lituratus*, Brullé, loc. cit., nec Oliv.)

Madeira (*Banks, Wollaston*).

Canaries (*Webb et Berthelot*).

Apparently the insular representative of *F. tetragrammicus*, maintaining slight distinctive features.

The type of *lituratus*, Brullé, is before me, and appears to be only a small example of *catta*, which is virtually acknowledged by Brullé; Olivier's species of same name is certainly different.

MYRMELEON ALTERNANS, *Brullé* (Hist. Canar. ii. pt. 2, p. 82, pl. iii. fig. 4; Hag. Ent. Month. Mag. ii. p. 61, redescribed).

Madeira (*Wollaston*).

Canaries (*Webb et Berthelot*).

I have not seen this species from the African continent nor from Europe, and do not think the synonymy suggested by Hagen (Ent. Month. Mag.) will hold good. Neither was my former coupling of *alternans* with *secretus*, Walker (*cf.* Journ. Linn. Soc., Zoology, ix. p. 279, and Ann. Soc. Ent. Belg. xvi. p. 138), justifiable. *M. alternans* is a broader-winged species, with more dense reticulation, the transverse nervules being faintly margined with greyish, bringing out the network very conspicuously. Brullé's type is before me.

The existence of several small species of *Myrmeleon* with the abdomen yellow-banded occasions much confusion.

MYRMELEON DISTINGUENDUS, *Rambur*. (*M. hyalinus*, Olivier??; Brullé, Hist. Canar. ii. pt. 2, p. 82, pl. iii. fig. 5.)

Canaries (*Webb et Berthelot*).

I have examined Brullé's type. *M. hyalinus*, Oliv., is an Arabian species, and its identity with the Canarian insect scarcely probable.

In the Brussels Museum and in my collection is a species collected by the late M. Camille Van Volxem, presumably in Portugal, that appears to me identical with the Canarian; both these and Brullé's types are ♂.

Furthermore I have re-examined two ♀ types of *M. distinguendus*, Ramb., from Malaga (in De Selys's collection). These are larger (expanse about 50 mm.); but otherwise they appear to me to agree; the only difference (other than size) is a slight variation in the form of the dark space on the head about the base of the antennæ, which has a triangular excision on the face in the types, not noticeable in the others; but in Rambur's description this character is given as an exception rather than as the rule.

In Brullé's type the dark markings on the head and thorax are

faint (principally owing to the age of the specimen), but are distinctly traceable.

I have a specimen from Damara Land, S.W. Africa, scarcely separable (Rambur states that *distinguendus* was known to him from Senegal); and *Myrmeleon ochroneurus*, Ramb., also from S. Africa, is clearly allied, but much larger.

As the examples from (presumably) Portugal are the most recent, I subjoin a description:—

Antennæ brownish, basal joint yellow; short and stout, the club gradually formed, broad, and much flattened. *Head* and *thorax* pale yellow. On the *head* the space surrounding the base of the antennæ is occupied by a large piceous band, descending on to the face; on the crown of the head are five raised transverse brown spots, three on the posterior margin, two on the disk, and between these latter a similar longitudinal twin-spot; two faint brownish spots on the clypeus. *Palpi* yellow; the terminal joint of the labial pair much inflated, acuminate and acute, nearly wholly shining piceous.

Pronotum with a blackish line on either side (only visible laterally); on the surface are five blackish spots, viz. four sublateral (the posterior pair oblique) and one in the middle. *Mesonotum* and *metanotum* with an irregular interrupted sublateral blackish band on either side; some of the sutures narrowly blackish; and there are two spots on the anterior lobe of the mesothorax. *Pleuræ* and *pectus* with black lines and spots.

Abdomen black, slightly clothed with short cinerous hairs; the lateral sutures and the divisions of the segments narrowly yellow; the apex nearly wholly yellow; superior appendages oblique if viewed laterally, in the form of two closely applied plates, open in front, furnished with long black hairs, and also with strong short black spines on the lower end; the inferior appendage forms a boat-shaped lobe (very concave above), not extending beyond the apex of the superior, and provided with long black hairs (♂).

Legs pale yellow, with black spines and shorter pale hairs; apex of tibiæ and of each tarsal joint blackish; first joint of tarsi equal to the second and third together, terminal joint equal to the second, third, and fourth united; spurs testaceous, shorter than the first joint; claws testaceous, slender, divaricate.

Wings narrow, hyaline, only slightly dilated in the middle, acute; reticulation wholly pale (the faintest trace of short brown spaces on the subcosta), set with short blackish hairs; ptero-

stigma scarcely indicated ; the corneous knob ("pelote") at the base of the inner margin of the posterior wings (♂) large, yellow.

Length of body 19 mm. Expanse of wings 38 mm. Breadth of anterior wings $4\frac{1}{2}$ mm.

CONIOPTERYGIDÆ.

CONIOPTERYX, sp. ?

Canaries: about pine trees near Aguamansa, Teneriffe, 4000 feet, 12th December, one example, apparently ♀ (*Eaton*).

I do not, at this moment, feel satisfied that this is identical with a British species. The example has about thirty-five joints in the antennæ, and ample posterior wings ; two forks in the apical neuration of both pairs of wings ; expanse of wings about 8 mm.

It should be remarked that this family requires a thorough generic and specific revision, which I hope soon to effect. Included in it are several very well-marked and distinct generic groups.

CONIOPTERYX PULCHELLA, n. sp.

Body fuscous, very densely clothed with the usual white waxy secretion. *Antennæ* whitish, 33-jointed. *Legs* whitish ; femora at the tips fuscous, and there is sometimes an indication of a fuscous line above, especially on the posterior. *Wings* of equal form, the posterior ample, very densely covered with white secretion (so that they scarcely transmit light), but *with numerous dark-grey spots* (on which the secretion appears to be less dense), as follows : on the basal half of each wing are about 6 to 8 small spots (less on the posterior) ; on the apical half are about 9 large spots ; all the spots are placed in the areas between the veins, and those round the apical and inner margin, between each apical sector, are very large, and triangular in outline ; two forks in the apical neuration in both pairs of wings.

Expanse about 6 mm.

Canaries : Montañas de Nordeste, Teneriffe, 2300 feet, under *Erica arborea*, 26th December, 2 examples, probably ♀ (*Eaton*).

So much is it the rule for the insects of this family to be uniformly covered with white or greyish secretion, that the existence of a species in which the wings were conspicuously spotted with darker might pardonably have been doubted.

The two examples of *Coniopteryx pulchella* are in very fine condition, and are beautiful little creatures.

PSEUDO-NEUROPTERA.

TERMITIDÆ.

CALOTERMES PRÆCOX (*Wollaston*), *Hagen* (Linn. Ent. xii. p. 51, Ent. Month. Mag. ii. p. 8).

Madeira (*Heinecken*).

TERMES LUCIFUGUS, *Rossi*. (*Hagen*, Linn. Ent. xii. p. 174, Ent. Month. Mag. ii. p. 9.)

Madeira (*Hartung*, *Wollaston*, *Heer*, *Eaton*). *Hartung* says it is very common near Arrabento, 3500 feet, and near Palheiro, 2000 feet. In the former locality the winged imago appeared on the 25th April, in the latter on the 9th May. *Eaton* found only larvæ in November.

N.B. I can find no record of any species of Termitidæ having been observed in the Canaries, but think some must certainly occur there.

PSOCIDÆ.

PSOCUS ADUSTUS, *Hagen* (Ent. Month. Mag. ii. p. 10).

Madeira (*Wollaston*).

This and the next species form a distinct group of the genus *Psocus* (as restricted), characterized by the very elongate narrow pterostigma.

PSOCUS PERSONATUS, *Hagen* (Ent. Month. Mag. ii. p. 11).

Madeira (*Wollaston*).

Canaries: near Las Palmas, Grand Canary, on an olive-tree, 6th December; near Aguamansa, Teneriffe, on *Laurus*, 16th December (*Eaton*).

In the few examples I have seen there appears to be considerable variation in the white markings on the top of the head. Mr. *Eaton* notes that in fresh examples the abdomen is whitish green, with a median blackish dorsal stripe dilated on each of the hinder segments, and with a blackish blotch on each side of it in its linear anterior portion: in the ♂ the belly is pale mingled with greyish black, in the ♀ wholly pale excepting along the spiracular region and at the apex.

STENOPSOCUS CRUCIATUS, *L.*

Madeira: near the Poizo, 4100–4300 feet, on *Laurus*, 23rd November, common (*Eaton*).

A very common and generally distributed European species. Some of the Madeiran examples are in a brachypterous condition. In England this condition is most frequent in early spring (as early as February in Cornwall), and is, I think, peculiar to the ♀.

Although it is a species excessively likely to be introduced with shrubs &c., I think that, from the altitude and the conditions under which it was found, it is in all probability endemic in Madeira. Moreover the examples from this island appear to present some slight peculiarities, the body, and especially the head, being paler (almost whitish yellow), with the markings of the head less distinct, though one should see others, taken at a warmer time of year, before deciding on this point. Occasionally the body of the brachypterous form is beautifully suffused with rosy.

CÆCILIUS MARMORATUS, *Hagen*. (*Psocus marmoratus*, *Hag.* Ent. Month. Mag. ii. p. 9.)

Madeira (*Wollaston*).

CÆCILIUS DALII, *M^r Lachlan*.

Madeira (*Wollaston*, in the British Museum, but not enumerated by *Hagen*): Sant' Anna, in the hotel garden, 30th November (*Eaton*).

Canaries: near Las Palmas, Grand Canary, amongst olive, 6th December (*Eaton*).

In Europe this species has only been discovered in Dorsetshire, England, amongst *Buxus* in Mr. Dale's garden, and at Florence, in Italy, amongst *Quercus ilex*.

PERIPSOCUS ALBOGUTTATUS, *Dalman*. (*Psocus pupillatus*, *Dale*, *Hagen*, Ent. Month. Mag. ii. p. 9.)

Madeira (*Wollaston*, 1 example).

I have some suspicion that two species are mixed under this name, but have not completed my observations. In England I find what appear to be two forms. One of these is common amongst pine and other trees, and is larger and paler, with the markings on the wings less distinct than in the other, which I find amongst *Calluna vulgaris*. The Madeiran example seems to pertain to this latter form.

Yet another species of this family, from Madeira, probably exists in Mr. Wollaston's collection in the British Museum; but it is not in a condition for minute examination, principally owing to its having been gummed on card, a practice to which Mr. Wollaston was so particularly attached.

EPHEMERIDÆ.

CLOËON DIPTERUM, *L.* (*Cloë diptera*, Hag. Ent. Month. Mag. ii. p. 25.—*Cloëon dipterus*, Eaton, Tr. Ent. Soc. Lond. 1871, p. 102.)

Madeira (*Wollaston, Eaton*).

Canaries: Teneriffe (*Eaton*).

Frequents the pools formed by the streams at their lower portions, and adjacent localities where the water is warm.

BAËTIS RHODANI, *Pictet.* (*Cloë maderensis*, Hag. Ent. Month. Mag. ii. p. 25.—*B. rhodani*, Eaton, Tr. Ent. Soc. Lond. 1871, p. 114.)

Madeira (*Wollaston, Eaton*).

Canaries: Grand Canary and Teneriffe (*Eaton*).

Frequents cool streams up to 3000 feet, or more.

N.B. I think it may be safely assumed that no other Ephemeridæ inhabit the islands. The acquisition of the subaquatic stages of insects of this family was above every other entomological consideration with Mr. Eaton during his visit, and no larva or nymph pertaining to other than these two species was discovered. Both are notorious for wide distribution.

ODONATA.

I am indebted to my friend Baron de Selys-Longchamps for having examined some Dragonflies concerning which I was uncertain, and for the loan of a series of examples bearing upon the identification of the species found in the islands.

Libellulina.

PALPOPLEURA MARGINATA, *Fab.* (*Libellula variegata*, F., Bory de St. Vincent, Essai, p. 369.—*L. Lucia*, Drury, ♀.)

Canaries (*Bory de St. Vincent*).

I have not seen this common African species from the islands; possibly it occasionally flies over from the mainland.

SYMPETRUM STRIOLATUM, *Charp.* (*Libellula striolata*, Hag. Ent. Month. Mag. ii. p. 27.—*L. vulgata*, Brullé, Hist. Canar. ii. pt. 2, p. 82.)

Madeira (*Wollaston*, several examples; *Eaton*, 1 very adult ♀, 23rd December).

Canaries (*Webb et Berthelot*; but there is a possibility that the next species was intended by Brullé).

Although I use the name *striolatum*, it is now, I think, generally believed that the species so termed and the *vulgata* of Linné are not separable.

SYMPETRUM FONSCOLOMBII, *Selys.* (*Libellula rubella*, Hag. Ent. Month. Mag. ii. p. 26, nec Brullé.)

Madeira (*Wollaston*).

Canaries: near Las Palmas, Grand Canary, 6th December (*Eaton*, 3 ♀).

A widely distributed species, which (notwithstanding its occasional appearance in England) must be regarded as pertaining to the Mediterranean fauna.

ORTHETRUM (?) CHRYSOSTIGMA, *Burm.* (*Libellula Olympia*, Brullé, Hist. Canar. ii. pt. 2, p. 82, nec Fonsc.—*L. chrysostigma*, *Burm. Handbuch*, p. 857.)

Canaries: Teneriffe (according to Burmeister; ♂ ♀ in the British Museum, *Wollaston* [the ♂ indicated as received from *Heer*]; Montañas de Nordeste, 26th December, *Eaton*, 1 very adult ♂.)

This insect has occasioned great perplexity with me, and has necessitated an extended review of *Libellula trinacria*, *Selys*, *L. barbara*, *Selys*, and allied forms, in which I have been aided by the temporary possession of materials communicated by Baron de Selys. I have also been able to examine the (now mutilated) ♀ type of *Olympia*, Brullé, which is certainly distinct from Boyer de Fonscolombe's French insect (= *carulescens*, Fab.) of that name. Not only specific, but also generic perplexity has been the result.

It has been considered probable that *chrysostigma*, *Burm.*, might be identical with *trinacria*, *Selys*, which, if well founded, would necessitate the deposition of the latter name as a synonym. *Libellula trinacria* has been referred to the genus *Leptthemis*, Hagen, which is especially characterized by the much inflated base of the abdomen in both sexes. The type of *Leptthemis* is the

American *Libellula vesiculosa*, Fab., and other American insects agree therewith in points of generic structure; but the Old-World species associated with them are divergent in several points (yet agree in having the base of the abdomen inflated *in both sexes*); and on a minute revision (a thing hoped for!) of the subfamily Libellulina they would have to be separated from their American allies. Let us now turn to a familiar group of Old-World forms, of which the British *L. cancellata*, L., and *cærulescens*, Fab., may be considered typical,—forms for which Newman, in 1833, proposed the generic term *Orthetrum* (= *Libella*, Brauer, 1868, a name otherwise inadmissible, because Selys had previously used it, and in Odonata). In the more typical forms of *Orthetrum*, neither ♂ nor ♀ has the base of the abdomen conspicuously dilated in comparison with the rest. But when we come to *Libellula barbara*, Selys, (and some others,) we are concerned with an insect the very adult male of which, in a thoroughly blue-pulverulent condition, is difficult to separate from *L. trinacria* in a similar condition, but in which the ♀ has the base of the abdomen in no way dilated. Therefore I should be disposed to consider *L. barbara* an *Orthetrum*, and to place *L. trinacria* (and immediate allies) in a distinct group (on account of the female characters), more related to *Orthetrum* than to *Leptemis* typically.

Now, as to the *specific* question involved in the Canarian *L. chryso stigma*. The materials examined by me are as follows:— (1) The mutilated ♀ type of *Olympia*, Brullé (remarkable for the presence of only two rows of discoidal areoles in the anterior wings for the greater part, an accidental condition, of which traces are frequently discernible in other species of the group); (2) the semiadult ♂ and very immature ♀ in the collection of the British Museum; (3) the very adult ♂ captured by Eaton, in my collection. The two females and the semiadult ♂ prove incontestably that *chryso stigma* is not conspecific with *trinacria*. But they show very close connection with *barbara*, yet are larger (about as large as small examples of *trinacria*); and, at this moment, the *size* is almost the only tangible point of difference apparent; for I fail to appreciate any striking differences in the genitalia of the second segment in the ♂, or in the vulvar scale (insufficiently examined on account of condition) of the ♀. From *trinacria* the immature or semiadult ♂ of *chryso stigma* (and also of *barbara*) may be at once separated by the thoracic markings (combined with the much smaller pterostigma); from highly adult

♂ of *trinacria* (wholly blue-pulverulent) the same sex of *chryso-stigma* (and also of *barbara*) may be separated by the presence of a small yellow marking at the base of the posterior wing margining the membranule.

I have entered at length into this subject on account of the difficult points involved. The summing-up is as follows:—(1) *Libellula trinacria* (and therefore *L. Sabina*, &c.) is not a true *Leptemis*, but is more allied to *Orthetrum*; (2) *L. chryso-stigma* is not identical with *trinacria*, but is very closely allied to *barbara* (? distinct therefrom*, cf. Hagen, Ent. Month. Mag. ii. p. 27), and is probably not to be generically separated from *Orthetrum*.

?? PLATETRUM DEPRESSUM, L. (*Libellula depressa*, L.?, Bory de St. Vincent, Essai, p. 369.)

I regard this avowedly doubtful identification as erroneous; but in a synopsis such as this the citation should not be lost sight of.

TRITHEMIS ARTERIOSA, Burmeister. (*Libellula distincta*, Ramb. —*L. rubella*, Brullé, Hist. Canar. ii. pt. 2, p. 82.)

Canaries (*Webb et Berthelot*); Montañas de Nordeste, Tenerife, 26th December (*Eaton*, 1 ♂ and 2 ♀, all very adult).

A widely distributed African species. Hagen referred *rubella* of Brullé to *Fonscolombii*, Selys, but certainly in error. The detailed description given by Brullé suits *arteriosa* admirably; and the identification therewith is confirmed by the much damaged ♂ type in the Paris Museum. A question of priority might be raised as regards the names *arteriosa* and *rubella*. The former was published in 1839; the volume of Zoology in Webb and Berthelot's work bears the dates 1836-44. Although this work was published in Paris, it is certain that Rambur was not aware of its existence (or, at any rate, of the portion treating on Neuroptera) when his own volume in the 'Suites à Buffon' appeared in 1842; and Burmeister's description had been published at least three

* The types of *chryso-stigma* ("♂ ♀ in cop. capt.") are in the possession of Dr. Hagen; and while this paper was being printed I received information from him to the effect that he considers them certainly identical with *barbara* (the former name having priority). He calls my attention to a supplementary note in the 'Revue des Odonates,' p. 398, as to an example of *barbara* from the south of Spain, said to exist in the Museum of the Jardin des Plantes at Paris, so that the species may therefore be considered European. I am not aware of any recent confirmation of this.

years previously. Rambur applied the name *arteriosa* as a doubtful synonym of *hæmatina*, which latter seems to have been a somewhat collective name, but not including the species under consideration.

The adult ♀ (so determined by De Selys) bears but little resemblance to the male. I am not aware that this sex has been described. The front is pale olivaceous; the side lobes of the labium rather distinctly margined with blackish on their contiguous edges. Thorax olivaceous, with an appearance of darker humeral lines, each side with three distinct black lines; pectus blackish, with three yellowish spots (as in the ♂), somewhat pulverulent. Legs black; tibiæ brownish externally; femora yellowish at the base, this colour more extended internally. Abdomen considerably shorter than in the ♂ (23 mm. as against 26 mm.), olivaceous, glaucous pulverulent beneath, the black lateral markings as in the ♂, but more extended; vulvar scale triangular. Wings hyaline; the anterior scarcely tinged with yellow at the extreme base; two very small yellow spots at the base of the posterior; pterostigma reddish brown; neuration brownish black, some of the costal and subcostal nervules paler; 11-12 antecubital nervules in the anterior.

CROCOTHEMIS ERYTHRÆA, *Brullé*. (*Libellula ferruginea*, *Brullé*, Hist. Canar. ii. pt. 2, p. 82.—*L. rubicunda*, *Bory de St. Vincent*, Essai, p. 362, nec L.).

Canaries (*Bory de St. Vincent*, *Webb et Berthelot*); Orotava, Teneriffe, about 1650 feet, December 16th (*Eaton*).

Eaton remarks that this handsome insect breeds in the reservoirs. The ♂ examples taken by him are very adult, and are slightly larger than those in my collection from various parts of the south of Europe, Africa, India, &c.

I incline to refer here an immature ♀ from near Las Palmas, Grand Canary, 6th December (*Eaton*), although *De Selys* expresses himself doubtful; the pale and dark humeral lines on the thorax of this example are very distinct*.

* *Brullé* says:—"Parmi les Libellules des Canaries se trouvent les deux sexes d'une jolie variété de cette espèce, dont la collection du Muséum renferme plusieurs individus provenant des Indes Orientales. Elle est d'un jaune roux, les côtés et le dessous de son corselet plus pâles, et chaque côté du corselet présente une bande brune étendue depuis l'origine de l'aile jusqu'au bord antérieur et bordée intérieurement d'une ligne d'un jaune clair." Probably the same form.

The *erythræa* group is one of extreme difficulty. It is probable that a solution may be found in the form of the genital parts of the second segment in the ♂; but it should be remarked that I find slight variation in this respect in series of individuals from the same locality, even in three ♂ before me from Orotava. De Selys has kindly lent me, for comparison, the types of *ferrugaria* (which he considers a synonym of *sanguinolenta*, Burmeister) and *inquinata*, Rambur. The ♂ of the former would seem to have the abdomen less broad, and with very considerable difference in the genitals of the second segment; but these latter are probably distorted. As for *inquinata*, the type is a ♀, and colour appears to be the principal character, the wings being more broadly yellow at the base, which colour is continued along the costal margin as far as the pterostigma.

Gomphina.

GOMPHUS, sp. ?

Madeira (*Hartung*).

Hagen (*Ent. Month. Mag.* ii. p. 27) says a species from Madeira is in the collection of Prof. Heer, but he had not seen it; he suggests that it is possibly *G. simillimus*, Selys. Probably it is the same species to which De Selys refers under *Gomphus Lucasii* in the 'Monographie des Gomphines,' p. 138.

Æschnina.

ANAX FORMOSUS, *Van der Linden.* (*Æschna formosa*, Brullé, *Hist. Canar.* ii. pt. 2, p. 82.—*A. formosus*, Hag. *Ent. Month. Mag.* ii. p. 27.)

Madeira (*Wollaston, &c.*).

Canaries (*Webb et Berthelot, &c.*); Tafira, 1500 feet, 8th December, and near Palmas, 10th December, Grand Canary (*Eaton*); Santa Cruz de Teneriffe, 28th December (*Eaton*).

In all probability this is the large Dragonfly referred to by most writers who have mentioned the insects of the islands; and I think it is a true native. Hagen (*Ent. Month. Mag. l. c.*) suggests that it may have been introduced with eggs of *Rana esculenta* in the same manner as there appears to be some reason to believe it was introduced into Sweden (*cf.* Hagen, *Revue des Odonates*, p. 394). But there is no necessity to suppose accidental or intentional introduction; an insect of such great power of wing could easily pass over from the mainland, or *vice versâ*. I do not find any

tangible differences in the examples from the islands, as compared with others from Europe &c. A ♂ in De Selys's collection certainly seems to have the superior appendages more attenuate at the apex; but I think it is owing to the turn they have taken in drying, and hence illusory.

? *ANAX MAURICIANUS*, Rambur.

Madeira.

I possess one ♂ *Anax* obtained from a dealer, and indicated from Madeira, that is probably referable to *mauricianus*; other insects accompanying it were certainly Madeiran.

Hagen (Verh. z.-b. Gesellsch. Wien, xvii. p. 44) doubts the distinctness of *mauricianus* from *formosus*; possibly it is only a case of slight variation; still there are certain structural peculiarities. Rambur, in describing his *mauricianus* (Névroptères, p. 184), alludes to several colour-differences that are probably illusory for the greater part. As to structure, he mentions, *inter alia*, the following points:—"Abdomen plus long, plus grêle;" superior appendages internally "plus profondément sinueux en approchant de l'extrémité, qui est plus étroite;" inferior appendage "un peu plus court;" "pterostigma beaucoup plus petit;" also "nervure costale chez le mâle n'était pas jaune antérieurement." In all these points my example fully agrees; but in some others—such, for instance, as the absence of little tubercles on the margin of the tenth segment—it does not accord. De Selys has kindly lent me a series of examples bearing upon the question, including one of Rambur's types from Mauritius*. This agrees with the description in most of the points mentioned, but disagrees in others (as does my example). The costal nervure is yellow externally in this, black in mine (I do not think I have seen a true *formosus* in which this nervure is black externally; but it may occur in very adult examples). The inferior appendage is still shorter in mine, scarcely longer than broad; in this it appears to agree with examples from De Selys, labelled by him "*mauricianus*, race *brevistigma*," received from Madagascar and Bourbon; and even the pterostigma in my example more approaches these. Probably it would be safer to refer *formosus*, *mauricianus*, and its race *brevistigma*, all to one species (*formosus*); but we yet require more extended local information †.

* Probably other types are in the Oxford Museum; but that in De Selys's collection should be from the same source, *i. e.* "M. Marchal."

† Hagen (Verh. z.-b. Gesellsch. Wien) alludes to the condition of the median

ANAX PARTHENOPE, *Selys*.

Canaries: Teneriffe (according to Brauer, Reise der 'Novara,' *Neuroptera*, p. 61). Not seen by me from the islands.

CYRTOSOMA EPHIPPIGERUM, *Burmeister*.

Canaries.

Hagen (Verh. z.-b. Gesellsch. Wien, xvii. p. 31) says he possesses an example indicated "im atlantischen Meere drei Meilen * von den canarischen Inseln, von Afrika kommend gefangen." This is a well-known migratory species, which occasionally appears on the European shores of the Mediterranean in great numbers, though I think there is as yet no evidence that it breeds in Europe. I have an example indicated as found on the shore at Mogador during a storm in January.

This species may safely be given as Canarian on the evidence of Hagen's specimen.

Agrionina.

ISCHNURA PUMILIO, *Charpentier*. (*Agrion pumilio*, Ramb. Névrop. p. 277; *Selys*, Revue des Odonates, p. 182; Hag. Ent. Month. Mag. ii. p. 27.—*I. pumilio*, *Selys*, Synops. Agrion., Légion 5, p. 23.)

Madeira (according to Rambur, in *Selys*'s collection; *Wollaston*); near Funchal, 20th November (*Eaton*).

All the females that I have seen from Madeira pertain to the dimorphic orange-coloured condition.

ISCHNURA SENEGALENSIS, *Rambur*.

Madeira.

My knowledge of this African species as Madeiran is based solely on 1 ♂ and 1 ♀ in De *Selys*'s collection. The ♂ is from Rambur's collection, and is labelled by him "*Agrion maderæ*," an unpublished name; it is in bad condition, but is certified as *senegalensis* by De *Selys*.

suture ("Quergräte") of the second segment of *formosus*, so far as the angle formed by it in its middle is concerned; I find all intermediate conditions in the long series before me, independent of locality.

* German miles must be understood.